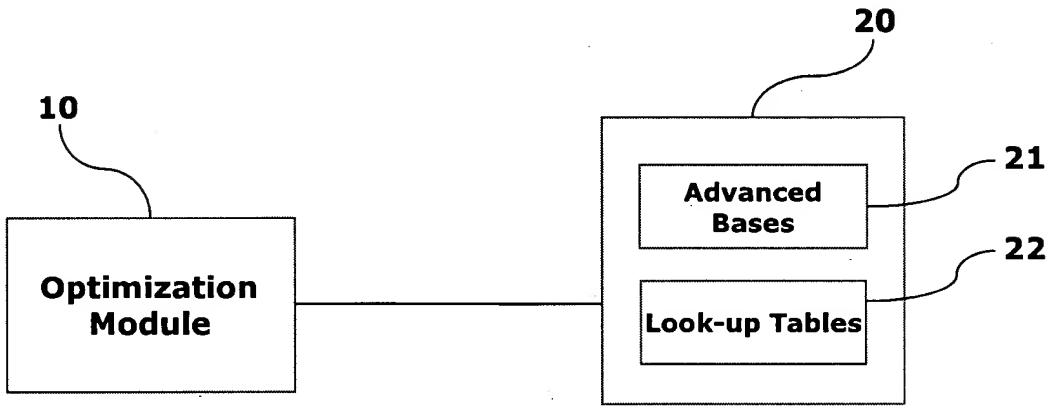

20
10
21
Advanced Bases
22
Optimization Module
Look-up Tables

Figure 1

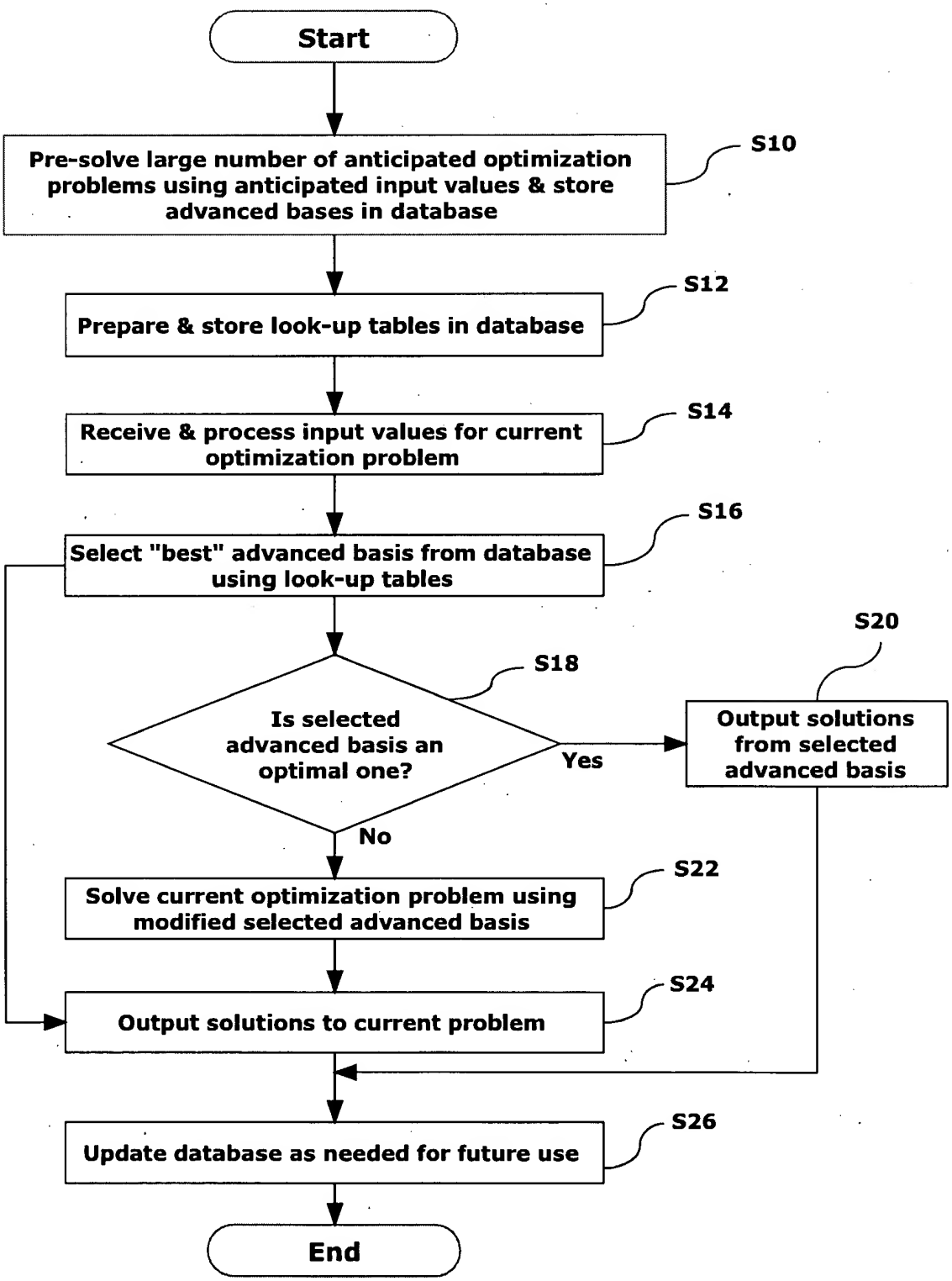
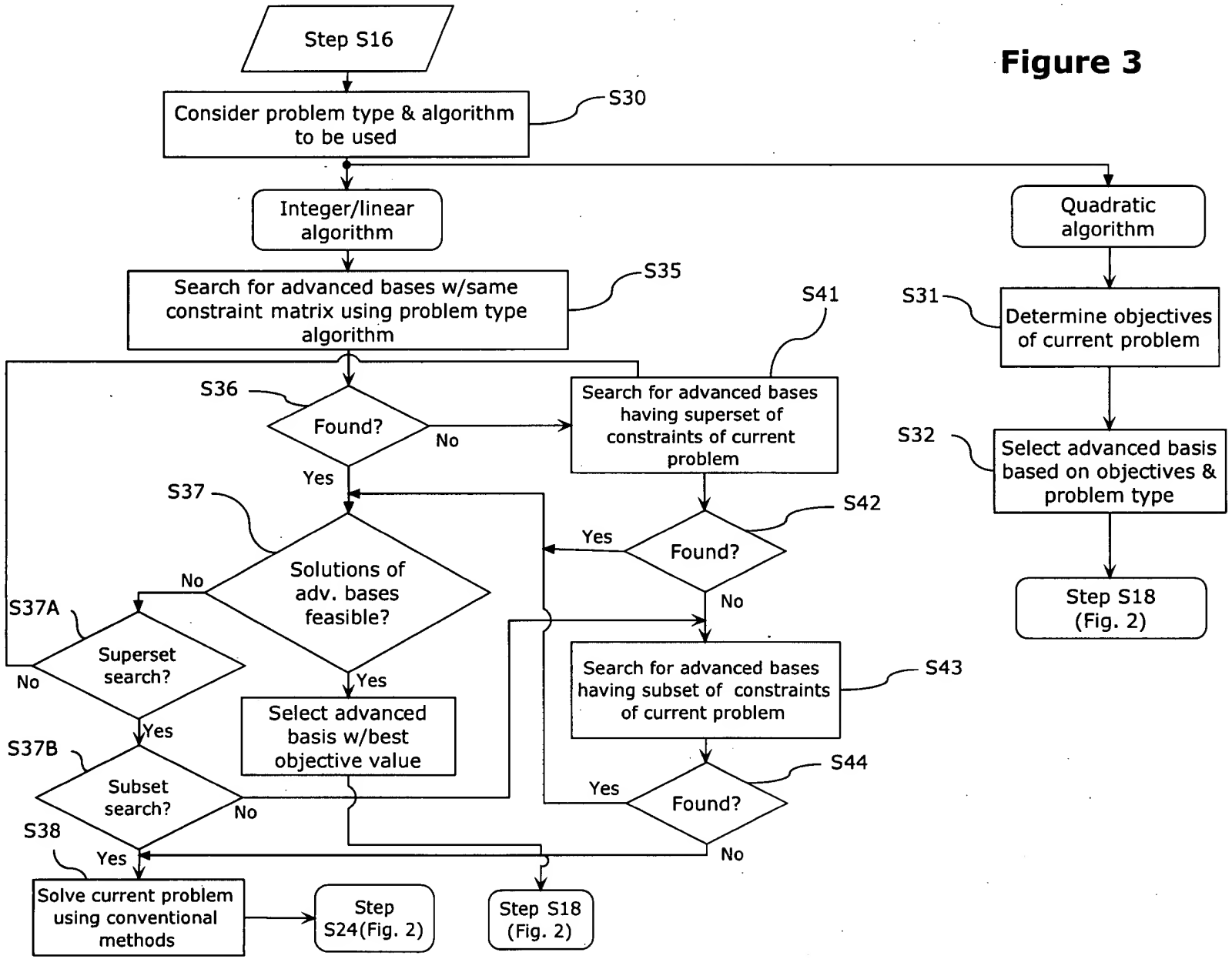

Start
Pre-solve large number of anticipated optimization problems using anticipated input values & store advanced bases in database
S10
Prepare & store look-up tables in database
S12
Receive & process input values for current optimization problem
S14
Select "best" advanced basis from database using look-up tables
S16
Is selected advanced basis an optimal one?
S18
Yes
No
Output solutions from selected advanced basis
S20
Solve current optimization problem using modified selected advanced basis
S22
Output solutions to current problem
S24
Update database as needed for future use
S26
End

Figure 2

Figure 3


Step S16
Consider problem type & algorithm to be used
S30
Integer/linear algorithm
Quadratic algorithm
Search for advanced bases w/same constraint matrix using problem type algorithm
S35
S41
S31
Determine objectives of current problem
S36
Found?
No
Search for advanced bases having superset of constraints of current problem
S32
Select advanced basis based on objectives & problem type
Yes
S37
S42
Yes
Found?
Solutions of adv. bases feasible?
No
No
S37A
Superset search?
No
Yes
Step S18 (Fig. 2)
Yes
Search for advanced bases having subset of constraints of current problem
S43
Select advanced basis w/best objective value
S37B
Subset search?
Yes
S44
Yes
Found?
No
S38
Yes
No
Solve current problem using conventional methods
Step S24(Fig. 2)
Step S18 (Fig. 2)

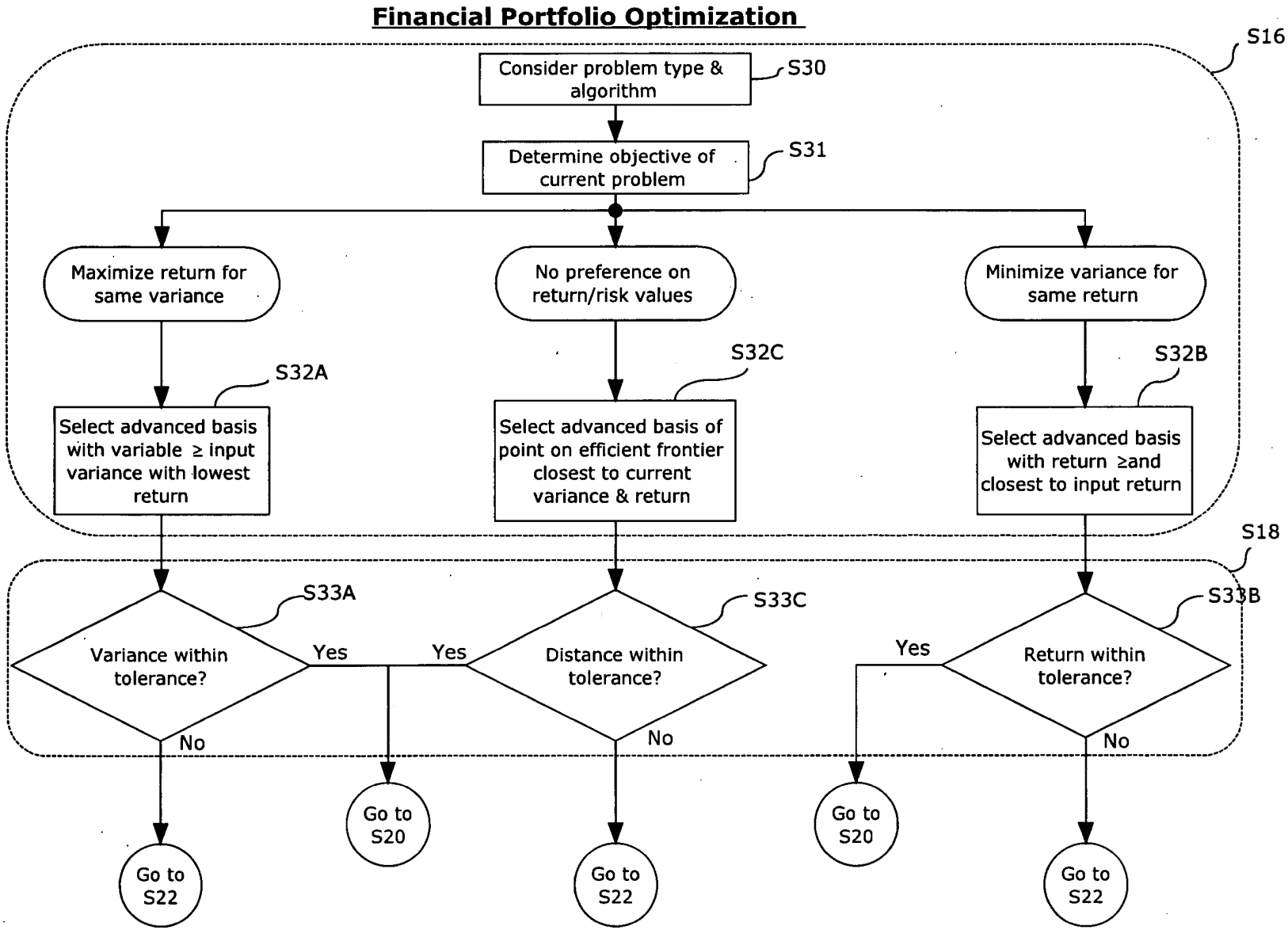

Financial Portfolio Optimization
S16
Consider problem type & algorithm
S30
Determine objective of current problem
S31
Maximize return for same variance
No preference on return/risk values
Minimize variance for same return
S32A
S32C
S32B
Select advanced basis with variable ≥ input variance with lowest return
Select advanced basis of point on efficient frontier closest to current variance & return
Select advanced basis with return ≥and closest to input return
S18
S33A
S33C
S33B
Variance within tolerance?
Yes
Yes
Distance within tolerance?
Yes
Return within tolerance?
No
No
No
Go to S20
Go to S20
Go to S22
Go to S22
Go to S22

Figure 4

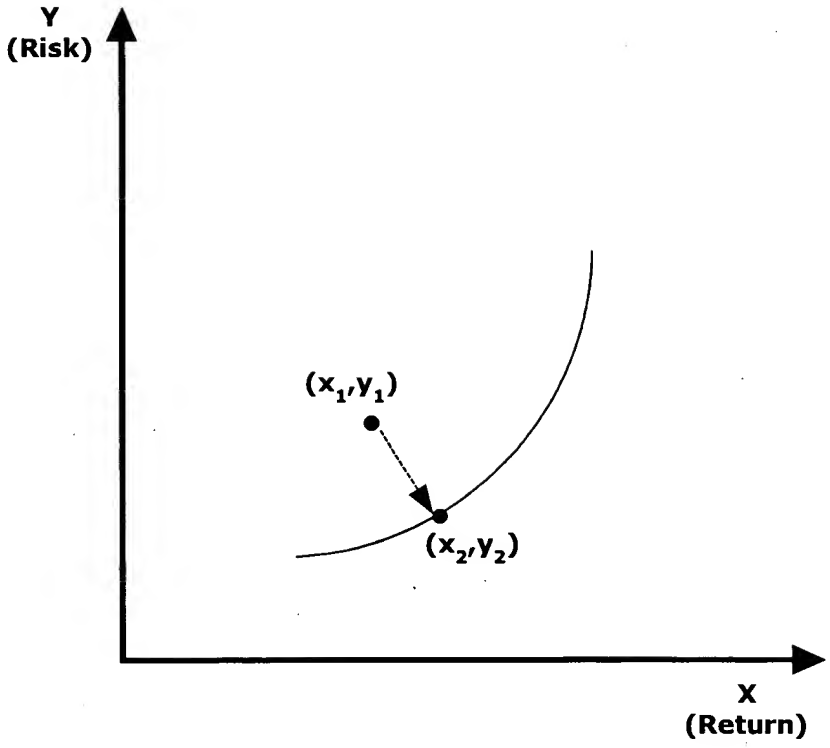


Figure 5

Table 1A

DATA_FILE_NAME	PROBLEM_TYPE	OPTIMIZATION_ALGORITHM
portfolio 1	stock	quadratic
portfolio 2	mutual fund	quadratic
portfolio 3	US bonds	linear
•		
•		
•		

Table 2A

	DATA_FILE_NAME	SOLUTION_ID	OBJECTIVE_ VALUE	ADDRESS
R1	portfolio 1	SOD14	12	1010
R2	portfolio 1	SID15	13	1020
R3	portfolio 1	SID16	15	1030
R4	portfolio 1	SID17	18	1040
R5	portfolio 1	SID18	22	1050
	•			
	•			
	•			

Table 3A

	DATA_FILE_NAME	SOLUTION_ID	EQUATION_NAME	RHS_VALUE
R1	portfolio 1	SID14	EQ1	14
R2	portfolio 1	SID14	EQ2	100
R3	portfolio 1	SID15	EQ1	15
R4	portfolio 1	SID15	EQ2	100
R5	portfolio 1	SID16	EQ1	16
R6	portfolio 1	SID16	EQ2	100
R7	portfolio 1	SID17	EQ1	17
R8	portfolio 1.	SID17	EQ2	100
R9	portfolio 1	SID18	EQ1	18
R10	portfolio 1	SID18	EQ2	100
	•			
	•			
	•			

FIGURE 6A

Table 1B

DATA_FILE_NAME	PROBLEM_TYPE	OPTIMIZATION_ALGORITHM
diet 1	calorie diet	linear
diet 2	carbohydrate diet	linear
•		
•		
•		

Table 2B

	DATA_FILE_NAME	SOLUTION_ID	OBJECTIVE_ VALUE	ADDRESS
R1	diet 1	S2000	12	3010
R2	diet 1	S2200	11	3020
R3	diet 1	S2300	9	3030
R4	diet 1	S2400	5	3040
R5	diet 1	S2500	4	3050
	•			
	•			
	•			

Table 3B

	DATA_FILE_NAME	SOLUTION_ID	EQUATION_NAME	RHS_VALUE
R1	diet 1	S2000	EQ10	2000
R2	diet 1	S2000	EQ11	100
R3	diet 1	S2200	EQ10	2200
R4	diet 1	S2200	EQ11	100
R5	diet 1	S2300	EQ10	2300
R6	diet 1	S2300	EQ11	100
	•			
	•			
	•			

FIGURE 6B